Aquatic Roots

Study Units
Unit 2: Aquatic Life; Unit 3: The World in a Pond; Unit 4: People, Land, and Water

Supplemental Information
People have always transported plants and animals from one area to another. Some transplants have no noticeable impact on native ecosystems, but others have become serious problems because they upset the ecological balance of a habitat. See the *Aquatic Invaders* fact sheet for information about aquatic exotics currently invading Iowa's aquatic resources which are causing (or may cause) problems for native systems. The *Introduced Animals* and *Introduced Plants* fact sheets include a list of some plants and animals introduced into the U.S. and/or Iowa.

Teaching Suggestions
Follow the instructions in the guide. Use the included information to form a list of local exotic plants and animals. Students may research exotic species using the *Biodiversity of Iowa: Aquatic Habitats* CD, in the library, or on the Internet. Go through the evaluation in the guide.

Evaluation
See the guide.

Student Materials
None

Teacher Aids
Fact Sheets: Aquatic Invaders; Introduced Animals; Introduced Plants
CD: Biodiversity of Iowa: Aquatic Habitats

Additional Materials
Aquatic Exotics (VHS; produced by the MN DNR and provided by the IDNR Aquatic Education Program to Area Education Agencies)

Iowa Department of Natural Resources. You Can Help Stop the Spread of Eurasian Watermilfoil. Des Moines

Iowa Department of Natural Resources. You Can Help Stop the Spread of Zebra Mussels. Des Moines

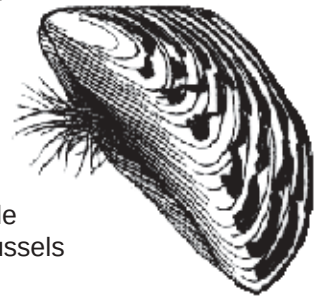
Various field guides for plants and animals (often tell if plant or animal is introduced, whether or not it is considered to be a pest, etc.)

www.iowadnr.gov/fish/index.html: IDNR Fisheries Bureau website (includes an information section about exotic aquatic species; several other internet sources for specific species)

Fact Sheet: Aquatic Invaders

Zebra mussels

Zebra mussels are small clams (1/2 - 2 inches) that attach to any solid object with tufts of fiber called "byssal threads." They are native to the Caspian Sea region of Asia and were introduced into North America in the mid 1980s via transoceanic ships that discharged ballast water into Lake St. Claire, near Detroit. Zebras have extended their range to parts of all the Great Lakes and much of the Mississippi River, and are beginning to infest inland lakes as well.



Zebra mussel

A single zebra mussel female can produce more than 30,000 eggs and they mature rapidly, making them difficult to control. A body of water may have no detectable zebra mussels one year, and have its bottom covered with them the next. Zebra mussels grow in thick mats on each other and other shells. Colonies can suffocate freshwater mussel beds. Several formerly productive beds already have been decimated by zebra mussels.

Large numbers of zebra mussels can filter all the water in a lake or stream, removing plankton (tiny plants and animals) that larval fish eat. Since zebras filter water so effectively, they increase water clarity. This results in increased aquatic vegetation, which has led to taste and odor problems in drinking water supplies.

Some ducks—scaup, canvasbacks, old squaws, and mallards—may feed on zebra mussels. Freshwater drum and yellow perch also have been seen eating juveniles, but predation is not controlling them.

Eurasian watermilfoil

Eurasian watermilfoil accidentally was introduced from Europe. Its spread westward into inland lakes and streams primarily is attributed to boats, with some spreading caused by birds. It reached the Midwest between the 1950s and 1980s and was first discovered in Iowa in 1992, in Hancock County's Crystal Lake. By 1993, the 260-acre lake was taken over by the plant and was unusable from mid-July until fall. It has since been reported in St. Benedict pond, Walnut Creek Marsh, Kounty Pond, Wilson Grove Pond, and Snyder Bend Lake. To date, all infestations in Iowa have been eradicated successfully with the exception of the Mississippi River.

In nutrient-rich lakes, it can form thick underwater stands of tangled stems and vast mats of vegetation at the water's surface. In shallow areas, the plant can interfere with boating, fishing, and swimming. The plant's floating canopy also can crowd out important native water plants.

Eurasian watermilfoil

A single segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant from lake to lake. Mechanical clearing of weed beds for beaches, docks, and landings creates thousands of new stem fragments that can drift with the wind and current.

Currently it is illegal in Iowa to 1) transport Eurasian watermilfoil on a public road, 2) place a trailer or launch a watercraft with Eurasian watermilfoil attached in public waters, or 3) operate a watercraft in a marked Eurasian watermilfoil area.

You can help control the spread of this aquatic invader:

- Clean all aquatic vegetation from your boat and trailer before leaving any boat ramp.
- Remove all plants and other debris from boats, motors, trailers, and other equipment before launching—especially if you have been in an infested area.
- Dispose of any plant debris away from the lake.
- Report any aquatic vegetation you suspect is Eurasian watermilfoil to DNR fisheries personnel.
- Pass the word about Eurasian watermilfoil to your friends and neighbors.

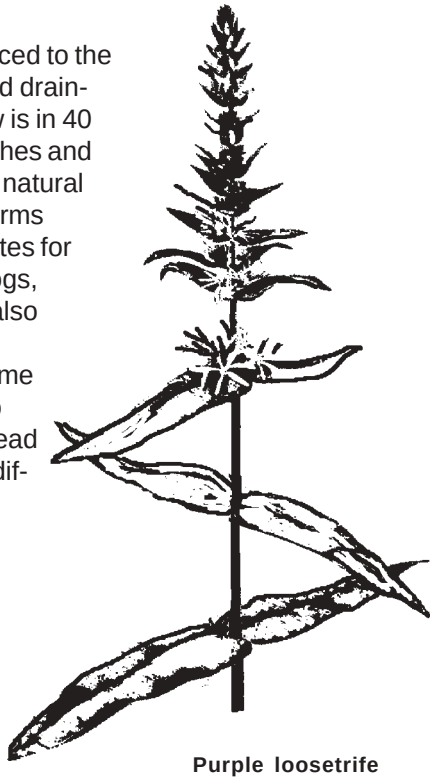
Fact Sheet: Aquatic Invaders (page 2)

Purple loosestrife

Purple loosestrife is a wetland plant from Europe and Asia. It was introduced to the east coast of North America in the 1800s. It spread along roads, canals, and drainage ditches and later was distributed as an ornamental garden plant. It now is in 40 states, Iowa included, and in all Canadian border provinces. It invades marshes and lake shores, replacing cattails and other wetland plants. In some locations, natural cattail marshes have been overtaken completely by loosestrife. The plant forms dense, impenetrable stands that are unsuitable as cover, food, or nesting sites for native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads, and turtles. Many rare and endangered wetland plants and animals also are at risk.

Purple loosestrife thrives on disturbed, moist soils, often invading after some type of construction activity. Seeds escape from gardens and nurseries into wetlands, lakes, and rivers. Once in aquatic systems, seeds are easily spread by moving water and wetland animals. Eradicating an established stand is difficult because of the enormous number of seeds the plant produces (often over two million seeds from a single adult plant annually). The plant also is able to sprout from its extensive underground root network and from broken stems that fall onto the ground or in the water.

A major reason for purple loosestrife's expansion is that it has no natural controls in North America. Several European insects that attack only purple loosestrife are being tested as possible long-term biological controls of the plant.



Purple loosetrife

In Iowa, the plant has spread along the Mississippi River, but it has been controlled fairly effectively in inland marshes and waterways. The DNR has spent a great deal of time and money to keep purple loosestrife out of wildlife and waterfowl habitat areas.

Other Invaders...

Several other "exotics" are showing up in Iowa waters, or are in neighboring states. It is not yet known how they will impact our aquatic ecosystems.

Invertebrates

The **spiny water flea** is small, about half an inch long with a long, sharp, barbed tail spine. It is native to Europe, but can now be found throughout the Great Lakes and in many inland lakes and waterways. ***Daphnia lumholzi*** is a microscopic animal that is difficult to detect. It is native to Asia and Africa, but became established (or noticed) by biologists in Missouri and Texas in 1990.

Fish

The **round goby** has not yet been sighted in Iowa waters, but this fish is increasingly common in the Great Lakes. It is native to the Black and Caspian Seas. The **rudd** is a member of the minnow family native to Eurasia, but now is in Illinois. The **ruffe** is a small member of the perch family that is native to central and eastern Europe. It was introduced in Minnesota and is spreading to other rivers and bays around Lake Superior. Four species of **carp** may become problems in Iowa waters: grass, bighead, silver, and black carp.

For more information about some of these invaders, check out the IDNR Fisheries home page at: www.iowadnr.com (click on "Fish and Fishing").

Fact Sheet: Introduced Animals

Below are some animals that have been introduced into areas in the United States other than their native ranges. (This is not a complete list.) Many have become nuisances, or even serious pests. Feral animals (domestic animals that have become wild again) have caused serious problems for many native animals.

INVERTEBRATES:

Insects:
commercial silk moths
German cockroach
gypsy moth
killer bees
oriental cockroach

Other Invertebrates:
spiny water flea
zebra mussel

FISH:
bighead carp
brown trout
common carp
goldfish
morone hybrid (wiper)
rainbow trout
round goby
ruffe
rudd
saugeye
silver carp
spotted bass
tiger musky
white amur (grass carp)

BIRDS:
back-necked swan
bar-headed goose
black francolin
black swan
blue-gray tanager
budgerigar
canary-winged parrot
chestnut munia
Chinese goose
chukar

BIRDS: (continued)
common waxbill
coternix
Egyptian goose
Eurasian tree sparrow
European goldfinch
European starling
golden pheasant
gray-necked wood rail
gray partridge
hill mynah
house sparrow
Java sparrow
Mandarin duck
monk parakeet
muskovy
pheasant
plain chacalaca
red-crested cardinal
ringed turtle dove
rock dove (domestic pigeon)
southern lapwing
spotbill duck
spotted munia
troupial
white-winged dove

MAMMALS:
domestic burro
domestic cat
domestic cow
domestic dog
domestic horse
domestic pigs
house mouse
Norway rat
nutria

Fact Sheet: Introduced Plants

Following are some plants introduced into Northeastern and North-Central United States. May are nuisance or "weed" species that compete with, or even replace, native plants.

alfalfa
alsike clever
Asiatic dayflower
barley
Barnaby's thistle
barnyard grass
Bermuda grass
birdsfoot trefoil
bitterdock
blackberry lily
black bindweed
black knapweed
black mustard
black swallowort
bladder
blessed thistle
bloody cranesbill
blue field madder
bouncing bet
branched broomrape
bristly foxtail
broom
broom knapweed
buckwheat
bugle
bulbous buttercup
bull thistle
butter and eggs
caltrops
Canada bluegrass
Canada thistle
caraway
catnip
cat's ear
celandine
centaury
charlock
cheeses
chickory
Chinese (Indian) mustard
clasping-leaved mullein
clustered bellflower
coltsfoot
comfrey
common burdock
common chickweed
common dandelion
common groundsel
common morning glory
common mullein
common nightshade
common plantain
common sorrel
common sow-thistle
common St. Johnswort
common tansey
corn cockle
corn gromwell
corn salad
cow vetch
crab grass
creeping bellflower
creeping buttercup
creeping wood sorrel
crown vetch
curled dock
cvinquefoil
cypress spurge
dame's rocket
day lily
deptford pink
dove's foot cranesbill
downy chess
dusty miller
dyer's greenweed
early wintercress
elecampane
English plantain
English rye grass
erect bugle
eulalia
Eurasian watermilfoil
European beggarticks
European mallow
European vervain
evening lychniss
everlasting pea
fall dandelion
feverfiece
field bindweed
field garlic
field mustard
field pansey
field pennycress
field scabious
field sow-thistle
flax
flower-of-an-hour
forking catchfly
fumitory
galinsoga
garden loosestrife
garlic mustard
goose grass
gorse
grape hyacinth
great burdock
great knapweed
green amaranth
green foxtail
ground ivy
hairy vetch
hare's-ear mustard
heal-all (self-heal)
heather
hedge mustard
helleborine
hemp-nettle
henbit
high mallow
hoary alyssum
horn poppy
horseradish
hound's tongue
hyssop
Indian strawberry
ivy-leaved morning glory
Japanese brome
Japanese honeysuckle

Fact Sheet: Introduced Plants (page 2)

Jerusalem oats
jimsonweed
Kenilworth ivy
Kentucky bluegrass
king devil
knawel
lady's thumb
lamb's quarters
lamb succory
leafy spurge
lesser broomrape
lesser celandine
lesser snapdragon
lesser stitchwort
live forever
maiden pink
marijuana
marsh mallow
marsh thistle
Mayweed
meadow cranesbill
meadow fescue
Mexican tea
moneywort
motherwort
moth mullein
mouse-ear chickweed
mouse-ear hawkweed
mullein pink
multiflora rose
musk mallow
nipplewort
night-flowering catchfly
nightshade
nodding thistle
oats
orange hawkweed
orchard grass
ox-eye daisy
oyster plant
patience dock
peppermint
pineapple weed
poison hemlock
prickly lettuce
prickly mallow
prickly poppy
prince's feather
prostrate knotweed
purple loosestrife
purslane
rabbit's foot clover
ragged robbin
reed canary grass
red bartsia
red campion
red clover
redtop (in part)
red turtlehead
roadside peppergrass
rye
rough-fruited cinquefoil
scarlet lychnis
scarlet pimpernell
scentless chamomile
Scotch thistle
sheep fescue
sheep sorrel
shepherd's purse
small bugloss
small red morning glory
smooth brome
smooth hawksbeard
smoothish hawkweed
sneezeweed yarrow
soft chess
spearmint
spider flower
spiny clotbur
spiny-leaved sowthistle
spring vetch
spotted knapweed
star of Bethleham
stinging nettle
stink grass
stinking groundsel
stonecrop
storksbill
sweetbrier
sweet vernal grass
sweet William catch-fly
tall buttercup
tall oats grass
tansy ragwort
teasle
thyme-leaved sandwort
tiger lily
Timothy
true forget-me-not
tumble mustard
tyrol knapweed
valerain
velvet grass
velvet leaf
viper's bugloss
water mint
weak sunflower
welted thistle
wheat
white clover
white mullein
white mustard
white sweetclover
wild bedstraw
wild carrot
wild chamomile
wild parsnip
wintercress
wood strawberry
wooly burdock
wrinkled rose
yarrow
yellow bedstraw
yellow iris
yellow vetchling
zig-zag clover

Major source used in compiling this list:

A Field Guide to the Flowers of the North-eastern and North-Central United States: Peterson Field Guide Series